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The differential law of wages

[London]

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Moore, Henry Ludwell, 1869- 1958
The differential law of wages, by Henry L. Moore ... [London] Printed for private circulation, 1908.
cover-title, 14 p. tables, diagr. 22 cm.

"Reprinted from the Journal of the Royal statistical society, Vol. LXX, Part IV (31st December, 1907)."

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THE

DIFFERENTIAL LAW OF WAGES.

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BY

HENRY L. MOORE,

Columbia University, New York.

FOUNDED 1834. INCORPORATED BY ROYAL CHARTER 1887.

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REPRINTED FROM THE JOURNAL OF THE ROYAL STATISTICAL SOCIETY
Vol. LXX, Part IV (31st December, 1907).

(PRINTED FOR PRIVATE CIRCULATION.)

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[illegible] 131, MW/AET

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The Differential Law of Wages. By HENRY L. MOORE, Columbia University, New York.

IN the present article I have tried to put a doctrine of pure economics to a statistical test. Such an undertaking implies at least three sources of error:—

(1.) Every doctrine of pure economics rests upon the assumption of perfect mobility of the factors of production, while, in fact, friction to an incalculable degree characterises the working of the industrial mechanism.

(2.) The statistics available are incomplete, since, notwithstanding great efficiency and honesty of purpose on the part of the Government officials charged with the collection and presentation of material, the comparatively few accessible records are themselves incomplete.

(3.) The two disciplines, statistics and pure economics, have hitherto been so unrelated that a series of hypotheses must be made in order to utilize the data and methods afforded by the one to render effective the theories of the other.

There is obviously great danger, therefore, when working upon a problem of this character, of introducing so many and such complex hypotheses as to vitiate any conclusions that may be reached. This danger has been constantly in mind as I have attempted, at several points in this investigation, to connect fact and theory, and special care has been taken, in the absence of full and precise data, to preserve a befitting sobriety in the use of hypotheses.

I.

The differential law of wages is the particular aspect of the theory of wages which it is proposed to investigate. The expression "theory of wages" may be understood to mean either of two things: it may mean the theory of the causes and method of apportioning the national dividend between capital and labour; or it may mean the theory of the apportionment of aggregate wages among subgroups of labourers, or among individual labourers. A complete theory of wages would afford a law of the distribution of the total product of industry between capital and labour, and a law of the distribution among individual labourers of the aggregate product going to labour as a whole. With the first part of the theory of wages, as here stated, our study is not concerned; for purposes of limiting the scope of the inquiry, it is assumed that this first part of the general problem is already solved. The second part of the theory, to which our investigation is confined, is, in substance, the differential law of wages.

The statement of the differential law of wages by the most approved authorities contains four leading propositions:—

(1.) The labour force in a country with varied industries is a force of varying efficiency per labourer unit;

(2.) The character of the industrial organisation of a particular

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The statement of the differential law of wages by the most approved authorities contains four leading propositions:—

(1.) The labour force in a country with varied industries is a force of varying efficiency per labourer unit;

(2.) The character of the industrial organisation of a particular time and place determines the nature and degree of segregation of labour into groups of varying efficiency. The two most fundamental groups are those of skilled and unskilled labour;

(3.) The labourer of least efficiency in each group receives a wage which constitutes the minimum wage of the group. This minimum wage is at least equal to the highest wage that the least efficient labourer in the group could earn in the other forms of employment open to him;

(4.) The more efficient labourers within the group receive the minimum wage of the group plus a supplement proportionate to the excess of their efficiency over that of the least capable labourer in the group.

The theory composed of these four propositions is an important part of the doctrine frequently summarized in the statement that the labourer tends to get what he produces. It is very essential to observe that the differential law covers only a part of this general theory of wages; for, however large or however small the labour dividend, it may be apportioned among the labourers according to their efficiency, and consequently it is not allowable to conclude from the fact of labour being rewarded according to efficiency that therefore labour gets what it produces.

Because of our failure to put the theory of differential wages to any kind of empirical test it is generally expounded in a form in which, despite the valuable parts that will be utilised, it must be regarded as without significance so far as scientific uses are concerned. For unless the postulate stated above in the first proposition—that the labour force of a country with varied industries is a force of varying efficiency per labourer unit—is rounded out into the law of the variation of efficiency, it is very little scientific gain to arrive at the conclusion that wages are distributed according to a law about which we know nothing. Each of the last three propositions in the above analysis of this theory is to be interpreted in the light of the first proposition, and the law postulated in this proposition we confess we do not know.

If this law of wages is to be put to a statistical test, it is clear that two points must be settled: (1) Some hypothesis must be made as to the law of distribution of efficiency; (2) Some allowance must be made for the peculiar economic conditions of the particular time and place. This latter point is the subject of the second of the four propositions into which the statement of the differential law of wages has been analysed. Whatever assumption may seem probable as to the distribution of efficiency, we know that the distribution of income will not be exactly according to the assumed law of efficiency because of the strategic advantage in bargaining, due to organisation or other causes, enjoyed by some of the labourers and not by others. The character and extent of these disturbing conditions must be ascertained in each particular case by a direct study of the labour environment.

First, as to the distribution of efficiency among labourers. In making our hypothesis we shall proceed from the simple to the complex. As it is generally conceded that industrial efficiency is the result of a combination of physical, mental and moral qualities,[1] it is quite likely that we may receive light as to the distribution of efficiency from a consideration of the distribution of physical, mental, and moral qualities. Three-quarters of a century ago Quételet observed that physical qualities are distributed according to the normal or Gaussian law, and the most elaborate recent investigation of the subject ends with this conclusion: "We have very definite evidence that the normal curve suffices to describe within the limits of random sampling the distribution of the chief physical characters in man."[2]

The general conformity of the measurements of physical characters to the normal curve suggests the proper hypothesis affecting the distribution of mental and moral qualities. A number of years ago, Mr. Francis Galton began his studies of inheritance on the assumption that the latter qualities are distributed according to the same law as are physical characters. Professor Pearson's laborious investigation, which has just been brought to a close, proceeds upon the same assumption: "We have . . . . selected, as the normal scale of intelligence, that which would be given if the frequency distribution of intelligence followed the normal or Gaussian curve of errors."[3] It would seem, therefore, that a not unreasonable hypothesis as to the distribution of efficiency, which is itself a balance of physical, mental, and moral qualities, is that it is according to the normal law of error.

We come now to the second part of the problem, namely, the determining of the effect of the peculiar industrial environment in altering the results which might be expected from the law of efficiency of labour. In the early part of this paper it was observed that usually two large groups of labourers are distinguished: the group of unskilled, unorganised labour, and the group of skilled, organised labour. These two groups, which for our purpose constitute the whole of labour, share between them aggregate wages. The members of the latter group, in consequence of their strategic advantage in bargaining, are able to obtain a larger share than would be obtained if total wages were distributed according to the law of efficiency which has been assumed to exist. If the proposed statistical test is to be carried through, some way must be found for determining the extent to which this cause affects the working of the law of reward according to efficiency. Later on the method employed in this study will be made clear. At this point a technical difficulty must be considered.

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[1] "We have next to consider the conditions on which depend health and strength, physical, mental, and moral. They are the basis of industrial efficiency, on which the production of material wealth depends." Marshall, *Principles of Economics*, 4th edition, p. 272.

For a further consideration of this point see an article on "The Efficiency Theory of Wages" in the *Economic Journal*, December, 1907.

[2] Karl Pearson, F.R.S., and Alice Lee, D.Sc., "On the Laws of Inheritance in Man," *Biometrika*, vol. ii, part iv, 1903, p. 395.

[3] Karl Pearson, F.R.S., "On the Relationship of Intelligence to Size and Shape of Head, and to other Physical and Mental Characters," *Biometrika*, vol. v, parts i and ii, 1906, p. 106.

II.

It has been assumed that the distribution of efficiency follows the Gaussian law. But this law is a generalisation applying to an infinite number of measurements, whereas statistics of wages are available for only a finite number of labourers. Furthermore, the Gaussian law is a description of the arrangement of many small groups according to the group measurement, whereas the differential law of wages purports to be a law of distribution of wages according to differential efficiency. It is necessary, therefore, to know, not how groups indefinite in number, are arranged according to efficiency, but how much, in a finite group of individuals selected at random, the members of the group will, on the average, differ from each other. Although the properties of the law of error have been investigated for over a century and the law has been applied to human data during the greater part of this period, no analytical solution of this differential problem was given until five years ago.

In 1902 Mr. Francis Galton proposed to British mathematicians this problem: "A certain sum, say 100*l.*, is available for two prizes to be awarded at a forthcoming competition; the larger one for the first of the competitors, the smaller one for the second. How should the 100*l.* be most suitably divided between the two? What ratio should a first prize bear to that of a second one? Does it depend on the number of the competitors, and if so, in what way? Similar questions may be asked, but will not be answered here, when the number of prizes exceeds two. What should be the division of the 100*l.* when three prizes are given, or four, or any larger number?"[4]

Mr. Galton's own investigation suggested "that when only two prizes are given in any competition the first prize ought to be closely three times the value of the second." The novelty and interest of the problem led him to conclude: "I now commend the subject to mathematicians in the belief that those who are capable—which I am not—of treating it more thoroughly may find that further investigation may repay trouble in unexpected directions."

Professor Pearson answered the appeal to mathematicians and undertook the solution of the problem in this general form: "A random sample of n individuals is taken from a population of N members which, when N is very large, may be taken to obey any law of frequency expressed by the curve $y = \mathrm{N}\phi(x)$, ydx being the total frequency of individuals with characters or organs lying between x and $x + dx$. It is required to find an expression for the average difference in character between the p^{th} and the $(p + 1)^{th}$ individuals when the sample is arranged in order of magnitude of the character."

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[4] Francis Galton, F.R.S., "The Most Suitable Proportion between the Values of First and Second Prizes," *Biometrika*, vol. i, part iv, p. 385.

"I propose to call this general problem *Francis Galton's Individual Difference Problem in Statistics*, or, more briefly, *Galton's Difference Problem.* It will be seen at once to carry us from the consideration of the means and standard deviations of mass aggregates and arrays to the average interval between individuals of those aggregates. We may still deal with *averages*, but we fix our attention no longer on the whole population, but on definite individuals in its ordered array. This I believe to be a real advance in statistical theory." The solution of the problem "provides us for the first time, I believe, with the most probable relationships between individuals forming a random sample."[5]

One would suspect that this problem had been formulated and solved with a view to the application of the results to our problem of the differential law of wages! For the knowledge of the average difference in efficiency between each of 1,000 labourers and his less efficient neighbour, when the whole number are ranked according to their efficiency, would afford data for determining the average difference in efficiency of the 999 labourers over their least efficient associate. Moreover, if the 1,000 labourers were separated into two groups, the one composed of the less efficient, and the other the more efficient, thus giving rise to a minimum wage in each group, the knowledge of the average difference of efficiency in the population of 1,000 would suffice for the computation of the average difference in efficiency of the members in each group over that of the least efficient member of the same group. To handle our problem of wages, the first need is the construction of a standard population in which the average difference of efficiency is computed. Such a standard population, judiciously used, would supply the means with which to obtain a first approximation to the solution of several questions in the dynamics of wages.

It would be desirable to have a standard population containing at least 500 members, but the laborious calculations required for so large a population has rendered the undertaking of the work impossible at the present time. Table 1, the construction of which is described in detail in the Appendix, has been computed on the assumption that the distribution of efficiency is according to the Gaussian law. We find, for example, that in a population of 100 individuals, selected at random, the difference in ability between the ablest and the next ablest is, on the average, ·360964 times the standard deviation of the group from which the selection is made. We do not pretend to know the actual magnitude of the standard deviation, nor is the knowledge necessary for our problem.

III.

Having constructed our standard population, we have next to describe the concrete environment to which it is applied. A recent investigation of wages in the United States affords for the first time an ample collection of wages distributed according to the frequency of the different rates. In the second chapter of the report on *Employees and Wages* of the Twelfth Census, which is the product of an elaborate investigation of wages in the manufactures of the United States, an "Analysis of Occupational Comparison" is presented by considering the wages of labourers in 32 industries. By means of pay-rolls of a number of representative establishments in each industry, the actual distribution of wages of each industry is determined and set forth. As a result of this admirable inquiry we are able to state the proportion of labour in each of the 32 industries receiving wages between any assigned limits.

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[5] Karl Pearson, "Note on Francis Galton's Problem," *Biometrika*, vol. i, part iv, p. 390—399.

In order to obtain as general a view as possible of the distribution of wages in the manufacturing industries of the country, these wage schedules for the several industries, in 1900, have been combined in the same way that the wage schedules for the establishments were combined in the several industries. The figures used are those given in the "Wages" volume, in the case of each industry, under the heading: "Males 16 years and over; Rates per week; All sections; All occupations." It was believed that an investigation confined to this category would be most representative of the wage-earning conditions of labour employed in manufactures.

The wage schedules of 30 industries fulfilled the above requirements. The two industries omitted from the full number given in the census volume are "collars and cuffs," and "distilleries." The former is not included because no schedule is given of males 16 years and over, and the latter is omitted because the few figures tabulated relate only to the States of Kentucky and Ohio.

The 30 industries are: (1) carpet mills, (2) cotton mills, (3) dyeing and finishing textiles, (4) knitting mills, (5) woollen mills, (6) agricultural implements, (7) furniture, (8) lumber and planing mills, (9) pianos, (10) wagons and carriages, (11) car and railroad shops, (12) foundries and metal working, (13) iron and steel, (14) shipyards, (15) bakeries, (16) breweries, (17) candy, (18) chemicals, (19) cigars, (20) clothing, (21) flour mills, (22) glass, (23) paper mills, (24) potteries, (25) printing, (26) rubber, (27) shoes, (28) slaughtering, (29) tanneries, (30) tobacco.[6]

As a result of the combination of the census schedules we have the distribution of wages recorded in Table 2.

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[6] The schedules may be found on the following pages of the Wages volume:—(1) carpet mills, p. 5; (2) cotton mills, p. 27; (3) dyeing and finishing textiles, p. 72; (4) knitting mills, p. 81; (5) woollen mills, p. 104; (6) agricultural implements, p. 143; (7) furniture, p. 169; (8) lumber and planing mills, p. 185; (9) pianos, p. 194; (10) wagons and carriages, p. 201; (11) car and railroad shops, p. 225; (12) foundries and metal working, p. 268; (13) iron and steel, p. 325; (14) shipyards, p. 353; (15) bakeries, p. 371; (16) breweries, p. 379; (17) candy, p. 391; (18) chemicals, p. 403; (19) cigars, p. 411; (20) clothing, p. 431; (21) flour mills, p. 461 (includes males under 16 years); (22) glass, p. 474; (23) paper mills, p. 497; (24) potteries, p. 510; (25) printing, p. 527; (26) rubber, p. 549; (27) shoes, p. 558; (28) slaughtering, p. 580; (29) tanneries, p. 591; (30) tobacco, p. 608.

IV.

How can these wage data be used to test the differential law of wages? Three difficulties must be solved before such a test can be made:—

(1.) The minimum wage to be assigned to the least efficient labourer in the standard population must be determined;

(2.) The total amount to be divided between the 100 labourers in the standard population must be estimated;

(3.) Allowance must be made for the effect of the breaking up of the labour force into two groups of the unskilled, unorganised labour; and skilled, organised labour.

The following is offered as a solution of the first difficulty: The range of the efficiency of the standard population is about five times the standard deviation, that is, about two and a half times the standard deviation on each side of the mean. By referring to a table of the values of the normal probability integral corresponding to x/σ, it is found that 62 in 10,000 cases exceed two and a half times the standard deviation. Consequently from each end of the empirical series of wages given in Table 2 were subtracted 62 ten-thousandths of the total number of labourers. The resulting distribution of wages is given in Table 3. The minimum is therefore $3.15.

The total amount divided between the 100 members of the standard population was regarded as one hundred times the average wage received by the labourers whose wages are given in Table 3. As the average wage in this case is $11.43, the members of the standard population share between them $1143.00.

The hypothesis which has been made to meet the third difficulty, namely, the effect in raising wages of the strategic advantage enjoyed by organised skilled labour, is that the more efficient 50 labourers in the standard population receive the same percentage of $1143.00—the aggregate wages paid to the standard population—that the more efficient 50 per cent. of the labourers in actual industry receive of the aggregate wages paid to labour. This hypothesis is offered only as a first approximation in the absence of means of determining exactly the number of labourers directly and indirectly affected by organisation in the manufactures of the United States. From Table 3 it is found that the more efficient half of the labourers actually received 64·71 per cent. of the total amount of wages, and the less efficient half, the remaining 35·29 per cent. It was therefore assumed that the less efficient 50 members of the standard population received 35·29 per cent. of $1143.00, and the more efficient half, the rest.

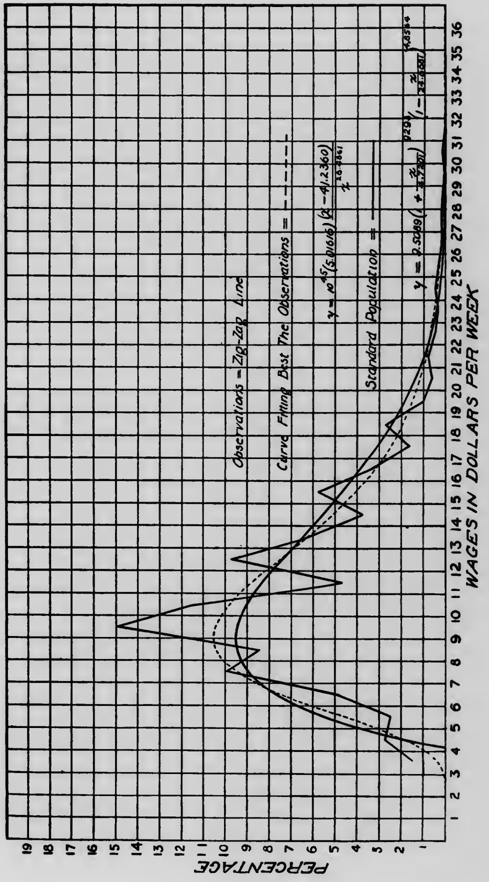
Our problem, now, is in this form: The wage received by the least efficient member of the standard population is $3.15; the less efficient 50 members divide between them 35·29 per cent. of $1143.00, that is, $403.36; each of the 50 members receives the minimum wage and, in addition, a part of $245.86—which equals $403.36 minus 50 times $3.15—determined by the excess of his efficiency over that of the man receiving the minimum wage. The more efficient 50 members divide between them 64·71 per cent. of $1143.00, that is, $739.64; each receives the highest wage paid in the group just described, namely, $10.30, and in addition a share of $224.64—which equals $739.64 minus 50 times $10.30—determined by the excess of his efficiency over that of the most efficient member of the less efficient group.

These 100 wage rates have been computed by means of Table 4. Columns I, II, V, VI have been taken from Table 1. Column III begins with the sum of the figures in column II. The meaning of this is that the difference in efficiency between the most able man in the standard population, and the fifty-first man is 2·526958 times the standard deviation. The second figure in column III is obtained by subtracting from the first figure in column III the first figure in column II. Since the difference between the ablest man, whom we call the first man, and the next ablest man, whom we call the second man, is ·360964 times the standard deviation, it follows that the difference between the second man and the fifty-first is 2·526958 − ·360964 = 2·165994 times the standard deviation. The other figures in column III are similarly determined by means of the figures in column II. The figure at the top of column IV, namely, 40·321478, is the sum of the figures in column III. Since the members of this more efficient of the two groups, which we shall call the first group, share the sum $224·64, according to the excess of their efficiency over the efficiency of the ablest member of the second group, it is necessary to express these 50 excesses or differences as percentages of the sum of the 50 differences. Column IV gives these percentages. For example, 2·526958 is 6·267 per cent. of 40·321478. As the wage received by the ablest member of the less efficient group is $10.30, and $224.64 is the sum divided by the members of the first group according to the excess of their efficiency over that of the ablest member of the second group, it follows that the wage of the ablest member of the standard population is $10.30 + (·06267) ($224.64) = $10.30 + $14.08 = $24.38. In a like manner the wages of the remaining 49 members of the first group are determined by means of the percentages in column IV.

Columns VII and VIII are constructed from column VI in exactly the same way that columns III and IV were constructed from column II. The wage of the fifty-first man, who is the ablest member of the second group, is equal to the minimum wage of the group, $3.15 + (·029083) ($245.86) = $3.15 + $7.15 = $10.30. Similarly the wages of the other members of the second group are calculated.

In Table 5 the wages of the standard population, computed by the method which has just been described, are arranged in groups varying by $1, just as the wage data of the census report are arranged in Table 3.

On the accompanying chart the zig-zag line traces the percentage distribution of actual wages according to Table 3. The dashed curve, which has been computed by the method of moments from the data of Table 3, is the curve fitting best the observations. Its equation is given on the chart, the origin being at − 38·69. The distribution of the wages received by the standard population, which is also a percentage distribution, could likewise be given by



a zig-zag line. If this course were followed, however, inasmuch as the standard population is so small, we should get a very irregular distribution, which would give only an imperfect idea of the agreement of fact and theory. Instead, therefore, of crowding the chart with this line, a smooth curve has been computed by the method of moments from the data of Table 5, and is drawn on the chart. This curve, the equation to which is given on the chart (the origin being at 8·89), is the closest fit to the actual distribution of the wages of the standard population. It begins at $4.17, reaches a maximum at $8.89, and terminates at $33.56. The degree in which this continuous smooth curve approaches the dashed curve is the measure of the degree in which the differential law of wages receives an empirical verification in our statistical data.

This investigation has established :—

(1.) That, lacking a hypothesis as to the distribution of efficiency, the theory of reward according to efficiency is without significance so far as scientific uses are concerned ;

(2.) That the differential law of wages is only an important part of the productivity theory of wages, and that the establishment of the law of reward according to efficiency does not imply that the labourer receives what he produces ;

(3.) That by making a hypothesis as to the distribution of efficiency, and a reasonable allowance for the influence of the organisation of skilled labour, the differential law may be subjected to an empirical test ;

(4.) That when the particular hypothesis of this study is tested with the data afforded by the Wage census of 1900, we find a remarkable consilience of fact and theory.

APPENDIX.

The Construction of Table 1. *The Standard Population.*

I. In computing the differences between the first six successive members of the standard population, Professor Pearson's formula, $\chi_p = s\,\frac{\sqrt{2\pi p}\;p^p e^{-p}}{\underline{|p}}\,\frac{1}{n y_m}\,\{1 + c_1 + c_2 + c_3\}$ (where s is the standard deviation), was used (*Biometrika*, vol. i, part iv, p. 396, formula xxvii).

II. Since, by Stirling's formula, when p is large, $\underline{|p} = \sqrt{2\pi p}\;p^p e^{-p}$, the factor $\frac{\sqrt{2\pi p}\;p^p e^{-p}}{\underline{|p}}$, in the above formula for χ_p, approximates to unity with increasing values of p. The last factor, $\{1 + c_1 + c_2 + c_3 + \}$, seems also to approach unity as p increases. When p is 5, $\frac{\sqrt{2\pi p}\;p^p e^{-p}}{\underline{|p}}\,\{1 + c_1 + c_2 + c_3\}$ is ·989794. It has consequently been thought sufficient for the purposes of this article to compute χ_p by the formula $\chi_p = \frac{s}{n y_m}$ for values of p greater than 5 and less than 51.

III. The values of m, which are needed to obtain y_m, were computed from the formula $\frac{n - 2p}{n} = \sqrt{\frac{2}{\pi}}\int^{m} e^{-\frac{1}{2}x^2}\,dx$. (*Ibid.*, p. 395, formula xii).

In making these computations the values of the probability integral, as given in *Merriman's Least Squares*, were used.

IV. The degree of accuracy of Table 1 is not so great as it appears to be, because, in the elevation of m, Barlow's tables were employed in calculating squares, and consequently only four figures were used. With this exception, the calculation has been carried to six decimals. The defect which has been described does not in any degree invalidate the theoretical result that has been reached, but it is noted here as a warning to others who, otherwise, might use the table for a purpose requiring greater precision.

TABLE 1.—*The Standard Population. Average Differences of Efficiency*

p	$\frac{\chi_p}{s}$	p	$\frac{\chi_p}{s}$	p	$\frac{\chi_p}{s}$	p	$\frac{\chi_p}{s}$
1	·360964	26	·030822	51	·025074	76	·032160
2	·200664	27	·030247	52	·025098	77	·032937
3	·144746	28	·029710	53	·025137	78	·033769
4	·114680	29	·029207	54	·025192	79	·034686
5	·095994	30	·028755	55	·025266	80	·035700
6	·083843	31	·028347	56	·025354	81	·036854
7	·074499	32	·027967	57	·025458	82	·038131
8	·067258	33	·027614	58	·025583	83	·039512
9	·061599	34	·027287	59	·025732	84	·041081
10	·056909	35	·026994	60	·025881	85	·042871
11	·053146	36	·026725	61	·026061	86	·044913
12	·049990	37	·026486	62	·026260	87	·047250
13	·047250	38	·026260	63	·026486	88	·049990
14	·044913	39	·026061	64	·026725	89	·053146
15	·042871	40	·025881	65	·026994	90	·056909
16	·041081	41	·025732	66	·027287	91	·061599
17	·039512	42	·025583	67	·027614	92	·067258
18	·038131	43	·025458	68	·027967	93	·074499
19	·036854	44	·025354	69	·028347	94	·083843
20	·035700	45	·025266	70	·028755	95	·095994
21	·034686	46	·025192	71	·029207	96	·114680
22	·033769	47	·025137	72	·029710	97	·144746
23	·032937	48	·025098	73	·030247	98	·200664
24	·032160	49	·025074	74	·030822	99	·360964
25	·031479	50	·025066	75	·031479	100	—

TABLE 2.—*The Distribution of Wages in Manufactures of the United States in* 1900, *as represented by* 30 *Selected Industries.*

Rates per Week.	Number.	Rates per Week.	Number.
Below $2.00	21	$	
$		Between 27 and 28	362
Between 2 and 3	591	,, 28 ,, 29	300
,, 3 ,, 4	2,646	,, 29 ,, 30	175
,, 4 ,, 5	4,331	,, 30 ,, 31	359
,, 5 ,, 6	3,880	,, 31 ,, 32	107
,, 6 ,, 7	7,926	,, 32 ,, 33	131
,, 7 ,, 8	15,727	,, 33 ,, 34	103
,, 8 ,, 9	13,233	,, 34 ,, 35	104
,, 9 ,, 10	23,686	,, 35 ,, 36	73
,, 10 ,, 11	18,029	,, 36 ,, 37	51
,, 11 ,, 12	7,346	,, 37 ,, 38	115
,, 12 ,, 13	15,412	,, 38 ,, 39	195
,, 13 ,, 14	9,945	,, 39 ,, 40	198
,, 14 ,, 15	6,046	,, 40 ,, 41	53
,, 15 ,, 16	9,223	,, 41 ,, 42	41
,, 16 ,, 17	5,468	,, 42 ,, 43	36
,, 17 ,, 18	2,607	,, 43 ,, 44	25
,, 18 ,, 19	4,466	,, 44 ,, 45	23
,, 19 ,, 20	1,620	,, 45 ,, 46	20
,, 20 ,, 21	1,029	,, 46 ,, 47	12
,, 21 ,, 22	1,290	,, 47 ,, 48	16
,, 22 ,, 23	773	,, 48 ,, 49	23
,, 23 ,, 24	571	,, 49 ,, 50	12
,, 24 ,, 25	764	,, 50 ,, over	168
,, 25 ,, 26	520		
,, 26 ,, 27	224	Total	160,076

TABLE 3.—*The Percentage Distribution of Wages, between assigned Limits, in the Manufactures of the United States in* 1900.

Rates per Week.	Number.	Percentage.	Rates per Week.	Number.	Percentage.
$			$		
Between 3.15 and 4	2,266	1·43	Between 21 and 22	1,290	0·82
,, 4 ,, 5	4,331	2·74	,, 22 ,, 23	773	0·49
,, 5 ,, 6	3,880	2·45	,, 23 ,, 24	571	0·36
,, 6 ,, 7	7,926	5·01	,, 24 ,, 25	764	0·49
,, 7 ,, 8	15,727	9·95	,, 25 ,, 26	520	0·33
,, 8 ,, 9	13,233	8·38	,, 26 ,, 27	224	0·14
,, 9 ,, 10	23,686	14·98	,, 27 ,, 28	362	0·23
,, 10 ,, 11	18,029	11·41	,, 28 ,, 29	300	0·19
,, 11 ,, 12	7,346	4·64	,, 29 ,, 30	175	0·11
,, 12 ,, 13	15.412	9·75	,, 30 ,, 31	359	0·23
,, 13 ,, 14	9,945	6·29	,, 31 ,, 32	107	0·07
,, 14 ,, 15	6,046	3·83	,, 32 ,, 33	131	0·08
,, 15 ,, 16	9,223	5·83	,, 33 ,, 34	103	0·06
,, 16 ,, 17	5,468	3·46	,, 34 ,, 35	104	0·06
,, 17 ,, 18	2,607	1·65	,, 35 ,, 35.95	69	0·04
,, 18 ,, 19	4,466	2·82			
,, 19 ,, 20	1,620	1·03			
,, 20 ,, 21	1,029	0·65	Total	158,092	100·00

TABLE 4.—*Percentage Rates at which more Efficient Members of the Two Groups share the Excess over the Minimum Wage of the respective Groups.*

I.	II.	III.	IV.	V.	VI.	VII.	VIII.
p	Difference $\frac{\chi_p}{s}$	Difference from the 51st Person.	Percentage of 40·321478.	p	Difference $\frac{\chi_p}{s}$	Difference from the 100th Person.	Percentage of 86·026422.
1	·360964	2·526958	·062670	51	·025074	2·501892	·029083
2	·200664	2·165994	·053718	52	·025098	2·476818	·028791
3	·144746	1·965330	·048741	53	·025137	2·451720	·028500
4	·114680	1·820584	·045152	54	·025192	2·426583	·028207
5	·095994	1·705904	·042308	55	·025266	2·401391	·027915
6	·083843	1·609910	·039927	56	·025354	2·376125	·027621
7	·074499	1·526067	·037847	57	·025458	2·350771	·027326
8	·067258	1·451568	·036000	58	·025583	2·325313	·027030
9	·061599	1·384310	·034332	59	·025732	2·299730	·026733
10	·056909	1·322711	·032804	60	·025881	2·273998	·026434
11	·053146	1·265802	·031393	61	·026061	2·248117	·026133
12	·049990	1·212656	·030075	62	·026260	2·222056	·025830
13	·047250	1·162666	·028835	63	·026486	2·195796	·025525
14	·044913	1·115416	·027663	64	·026725	2·169310	·025217
15	·042871	1·070503	·026549	65	·026994	2·142585	·024906
16	·041081	1·027632	·025486	66	·027287	2·115591	·024592
17	·039512	·986551	·024467	67	·027614	2·088304	·024275
18	·038131	·947039	·023487	68	·027967	2·060690	·023954
19	·036854	·908908	·022542	69	·028347	2·032723	·023629
20	·035700	·872054	·021628	70	·028755	2·004376	·023300
21	·034686	·836354	·020742	71	·029207	1·975621	·022965
22	·033769	·801668	·019882	72	·029710	1·946414	·022626
23	·032937	·767899	·019044	73	·030247	1·916704	·022280
24	·032160	·734962	·018228	74	·030822	1·886457	·021929
25	·031479	·702802	·017430	75	·031479	1·855635	·021571
26	·030822	·671323	·016649	76	·032160	1·824156	·021205
27	·030247	·640501	·015885	77	·032937	1·791996	·020831
28	·029710	·610254	·015135	78	·033769	1·759059	·020448
29	·029207	·580544	·014398	79	·034686	1·725290	·020055
30	·028755	·551337	·013674	80	·035700	1·690604	·019652
31	·028347	·522582	·012960	81	·036854	1·654904	·019237
32	·027967	·494235	·012257	82	·038131	1·618050	·018809
33	·027614	·466268	·011564	83	·039512	1·579919	·018366
34	·027287	·438654	·010879	84	·041081	1·540407	·017906
35	·026994	·411367	·010202	85	·042871	1·499326	·017429
36	·026725	·384373	·009533	86	·044913	1·456455	·016928
37	·026486	·357648	·008870	87	·047250	1·411542	·016408
38	·026260	·331162	·008213	88	·049990	1·364292	·015859
39	·026061	·304902	·007562	89	·053146	1·314302	·015278
40	·025881	·278841	·006915	90	·056909	1·261156	·014660
41	·025732	·252960	·006274	91	·061599	1·204247	·013999
42	·025583	·227228	·005635	92	·067258	1·142648	·013283
43	·025458	·201645	·005001	93	·074499	1·075390	·012501
44	·025354	·176187	·004370	94	·083843	1·000891	·011635
45	·025266	·150833	·003741	95	·095994	·917048	·010660
46	·025192	·125567	·003114	96	·114680	·821054	·009544
47	·025137	·100375	·002489	97	·144746	·706374	·008211
48	·025098	·075238	·001866	98	·200644	·561628	·006529
49	·025074	·050140	·001244	99	·360964	·360964	·004196
50	·025066	·025066	·000622				
Total	2·526958	40·321478	—	Total	2·501892	86·026422	—

Table 5.—*The Distribution of Wages of the Standard Population.*

Rates per Week.	Number.	Rates per Week.	Number.
$3.15	1	$	
$		Between 15 and 16	4
Between 4 and 5	2	,, 16 ,, 17	4
,, 5 ,, 6	3	,, 17 ,, 18	3
,, 6 ,, 7	6	,, 18 ,, 19	3
,, 7 ,, 8	9	,, 19 ,, 20	2
,, 8 ,, 9	11	,, 20 ,, 21	1
,, 9 ,, 10	13	,, 21 ,, 22	1
,, 10 ,, 11	10	,, 22 ,, 23	1
,, 11 ,, 12	7	,, 24 ,, 25	1
,, 12 ,, 13	6		
,, 13 ,, 14	6		
,, 14 ,, 15	6	Total	100

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John A. P. Mackenzie.

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